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BUTLER¹² rejects the earlier view of BEIJERINCK and RANT, that gummosis is due to a cytase which, unable to attack the wall of a living cell does so as soon as the cell is injured from any cause. He also rejects RUHLAND's view that the gum is an oxidation product of carbohydrates and that gummosis is caused by admission of air through wounds. BUTLER considers that "gummosis is due to hydrolysis of the walls of the embryonic wood cells, which develop into a susceptible tissue." The form of development of a spot of gummosis shows, however, that it is correlated with release of pressure of the cortical tissues. Gummosis does not occur unless the cambium is growing actively and there is an abundant supply of water available to the roots; when these two conditions are present gummosis may develop "autogenously" or be induced by any sort of injury that stimulates growth of the cambium. Contrary to previous investigators, BUTLER states that starch and other cell contents play no part in gum formation. "Gummosis of *Prunus* and gummosis of *Citrus* are indistinguishable maladies." Both squamosis and exanthema are considered to be forms of gummosis. An excellent bibliography is appended.—HAVEN METCALF.

Root habits of desert plants.—In studying the roots of plants growing near the Desert Laboratory, Tucson, Ariz., CANNON¹³ has made a rather detailed investigation of more than 60 species, including winter and summer annuals as well as various types of perennials. Three general types of root systems are recognized, namely, a generalized system with both tap and lateral roots well developed, a specialized type with the tap root the chief feature, and a second specialized type in which the laterals, placed near the surface of the ground, are especially well developed. The cacti are almost the sole representatives of the last type, and represent a specialization of a xerophytic form capable of absorbing a water supply from rains which penetrate a few centimeters only. This type seems necessarily limited to plants with very considerable water-storage capacity. A further specialization in the roots of most cacti is to be seen in the development of an anchoring and an absorbing system.

Plants having prominent tap roots include comparatively few species. They are mostly perennial in habit and limited in their distribution to areas with considerable depth of soil. In contrast, the generalized system is characteristic of the majority of both the perennial and annual species. It facilitates distribution because of its plasticity, and because its representatives are found in widely varying situations. It is to be regarded as the least xerophilous of

¹² BUTLER, ORMOND, A study on gummosis of *Prunus* and *Citrus*, with observations on squamosis and exanthema of the *Citrus*. Ann. Botany **25**:107-153. pls. 4. 1911.

¹³ CANNON, W. A., The root habits of desert plants. Carnegie Institution of Washington. Publ. No. 131. pp. 96. pls. 23. 1911.

the three systems, and hence includes almost all the annual plants. Few of these annuals penetrate the soil deeper than 20 cm., and most of the lateral branches are less than half this distance from the surface. Competition is evident between the various members of the generalized type, and also between them and those of the first specialized class. The best development of root systems is found in the summer annuals, due to more favorable vegetative conditions, and particularly to more favorable soil temperature during that portion of the year.

The details of root development in the various species are illustrated by many photographs and drawings, while the detailed descriptions contain many interesting facts concerning the different plants.—GEO. D. FULLER.

Chromatophores and chondriosomes.—FORENBACHER¹⁴ has made a study of the origin of chloroplasts and leucoplasts in the stem and root of *Tradescantia virginica*, the object of which is to show the origin of these structures from chondriosomes (filamentous mitochondria). Beginning with the fully formed chloroplasts of the stem cortex and leaves and proceeding toward the tip, he finds a complete gradation between the fully formed chloroplasts and the chondriosomes. The intermediate forms present themselves as dumb-bell and granular structures which gradually pass over into the chromatophores. Similar gradations are found between the chondriosomes (mitochondria) of the root tip and the leucoplasts. This work thus confirms the results of PENSÁ and LEWITSKY and those of GUILLIERMOND on the origin of the chloroplasts from mitochondria (chondriosomes).

Some doubt is justified of the efficiency of the methods employed for demonstrating the chondriosomes of plant cells. MEVES, for example, found these structures in the tapetal cells of *Nymphaea*, but not in the spore mother cells, in which, however, by suitable methods they may be shown to be very numerous. The reason was the small power of penetration of the fixing fluid, which did not reach the deeper tissues before the mitochondria had undergone change or disappeared. In eliminating acetic acid wholly from his fixing fluid, FORENBACHER has diminished its already slight power of penetration. His figures are not convincing, for the structures labeled as chondriosomes do not conform in shape or number to the usual condition in rapidly dividing cells of higher plants. It is quite possible that his young chloroplastids do not belong to the category of mitochondria (chondriosomes) at all.—R. R. BENSLEY.

Vascular anatomy of Salicales.—Miss HOLDEN¹⁵ has investigated the position of Salicales on the basis of the vascular anatomy of the North American

¹⁴ FORENBACHER, AUREL, Die Chondriosomen als Chromatophorenbildner. Ber. Deutsch. Bot. Gesells. 29:648-660. pl. 25. 1911.

¹⁵ HOLDEN, RUTH, Reduction and reversion in the North American Salicales. Ann. Botany 26:165-173. pls. 20, 21. 1912.